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it should be possible to get these slips back at the end of each month, together with the average number of patients. On each ward should be a list with the average prices for food, household goods, gauze, bandages, drugs, etc., and with this help a paper could easily be made up, perhaps like the following sample. This bill is, of course, only meant to show the cost of living, not the actual cost for keeping a patient in the hospital, as for that many more things have to be considered. If for any reason the slips could not be returned to the wards, the necessary figures might easily be put down in a printed book every morning, but the first method seems preferable.

MONTHLY REPORT, WARD 8. SURGICAL NURSE

Extra Orders

ARTICLES	PRICE	ARTICLES	PRICE
Milk	$12.00	Cleansing soap	$2.00
Butter	5.00	Matches	.50
Bread	6.00	Breakages	2.50
Eggs	6.00	Wear out	4.00
Broth		Extras from household	
Extras from kitchen	8.00	Individual medication	2.00
Sugar	1.00	General medication	5.00
Cocoa	1.50	Alcoholics	2.50
Coffee		Extras from pharmacy	5.00
Tea		Gauze	24.00
Salt	.25	Bandages	8.00
Extras from steward	2.00	Safety pins	.50
Hand soap	2.00	Writing mat	1.50
			$101.25

Average number of patients	20
Total for 20 patients, 30 days	$101.25
Total for 1 patient, 30 days	5.06
Total for 1 patient, 1 day (about)	.17
Daily cost of meals	1.25
Daily cost of living	1.42

ELECTRO-THERAPEUTICS

(Second Paper)

By MARTIN W. CURRAN, M.D.

Chatsworth, N. J.

We often speak of different kinds of electricity in the treatment of disease, such as galvanic, faradic, static, etc., yet there is but one kind of electricity, yet we are able to modify or alter its energy to such an extent by different mechanical appliances, obtaining different electrical phenomena and therapeutic results, similar to the varied actions of a drug when given in different sized doses, as to almost warrant us in believing that there are different forms of electricity. We also talk glibly about the flow of electricity, while it is not known that electricity "flows" at all, yet it is a convenient method of expression to illustrate simply the progress of electricity from one substance to another.

Magnetism. We are all familiar with the horse-shoe magnet, sold in all toy stores, and in other days we derived much amusement in having it attract pins and needles, which attached themselves to the magnet. To understand a magnet properly, suppose we make one. Take a piece of steel, and wind around it some fine copper wire, commence at one end of the horse-shoe and continue until we reach the other end. Connect the two ends of the wire with a cell giving, say 1½ volts, and then the amperes of current of electricity will travel through the wire, and convert the steel horse-shoe into a permanent magnet such as you have played with. There is nothing mysterious or complicated about that, and if instead of using a piece of steel we use a horse-shoe made of soft iron, it would not be a magnet after you shut off the current from the battery, but the piece of soft iron would be a stronger magnet while the electricity was flowing along the wire surrounding it, and is called therefore an *electro-magnet.* Bear in mind that an electro-magnet is simply a piece of iron, surrounded by a coil of wire, called a helix, carrying a current of electricity.

Now, suppose this current of electricity was being supplied by two cells giving say three volts, you could not feel any shock; but if you were to take hold of the ends of the wires on the electro-magnet and separate them while the same current was going through, you would get a decided shock. This separation would "break" the circuit, and the reason you would get a shock is that while the electricity is acting on the wire, the iron itself is magnetized, and on breaking the circuit reacts upon the wire, producing for a moment more volts of pressure in every turn of it. Thus you see, this weak pressure of electricity as it travels through the wire can yet produce, through its magnetism, strong momentary effects, but you cannot feel it unless you break the circuit.

Induction coil. With the steel horse-shoe we made a permanent magnet, and by using a soft iron-horse-shoe we made an electro-magnet, so let us now make an induction coil, and instead of using one piece of iron, as we did for the ordinary permanent, or electro-magnet, we take a bundle of iron wires, and around this bundle of wires we wrap many turns of insulated copper wire. This is called the primary coil, and the ends of this wire are to be attached to the battery or cells. On top of, or over, this primary coil we wrap a great many turns of very fine wire. This is called the secondary coil, and it is in this coil that the volts or tension or pressure, of electricity becomes strongest.

On some medical batteries you will find an induction coil, shaped like a large spool (fig. 2), and covered with many layers of wire, and on the left hand side of the induction coil, you will find a "circuit breaker," which is simply a piece of iron (armature) on a spring placed opposite the iron core in the induction coil. This armature is made a part of the wire leading to the primary coil. When the current from the cells is sent through the wires, the core becomes magnetized and draws this armature away from a fixed contact point, thus breaking the circuit, but the spring pulls it back again, completing the circuit, and so it keeps going back and forth very rapidly with a br-r-r-ing sound.

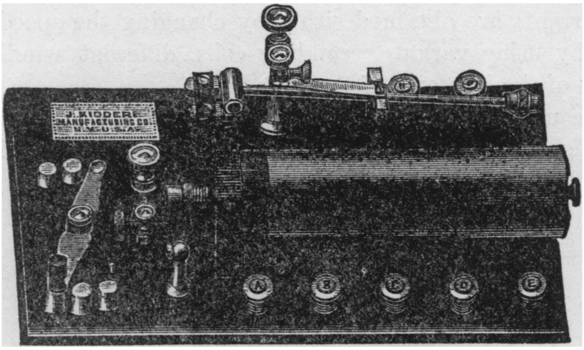

FIG. 2. INDUCTION COIL

Most of use have taken hold of the handles of a medical battery and have had shocks therefrom. In so doing, you simply had the current from the secondary coil of an induction coil. The current may be made weaker by sliding a metallic cover over part of the iron core, and so shutting off part of the magnetic effect.

When a street current is called direct it means that the current always flows in one direction, and if the current is called alternating, it is because the current flows first in one direction and then in the other, thus undergoing periodical change of direction and intensity.

Galvanic current. We must have a direct current if a galvanic treatment is to be given, the terms *galvanic, direct* and *continuous* when applied to the electric current are synonymous. If it is desired to use the street current where only the alternating current is available, one has a choice of three methods of securing a direct current, viz; a battery of dry or wet cells, an electrolytic rectifier to change the alternating into a direct current or a motor generator. A galvanic, direct or continuous current means a current having a large volume, or amperage, with a small voltage, intensity, or electro-motive force.

Sinusoidal current. With the general call for sinusoidal current, a great many physicians are using the street alternating current which is in reality a sinusoidal current. Briefly stated, a sine wave or sinusoidal current is a current which rises like a wave to a certain point, then, without breaking, drops or recedes and, without pausing, rises to the same maximum again in the opposite direction, and continues thus to rise and fall without intermission or break, first flowing in one direction, then in the other.

Faradic current. The induced or faradic current is taken from the secondary current of an induction coil (fig. 3). It is of high intensity but low amperage. The variations in the character and strength of the induced currents are obtained either by changing the speed of the interrupter, by using various secondary coils, different windings, or by adjustment of the iron core of the coil.

Now we understand something of the principles of magnetism, induction coils, galvanic, sinusoidal and faradic currents, and in our next paper will discuss electrolysis, ionization, static electricity and the X-rays.

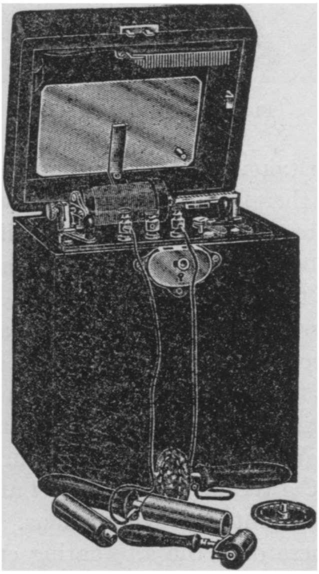

FIG. 3. FARADIC BATTERY SHOWING INDUCTION COIL AND ELECTRODES